

MANISTIQUE RIVER MANGEMENT PLAN

River Management Plan 06

January 2005

George Madison

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Introduction

This plan is a companion document to the Manistique River Assessment (Madison and Lockwood 2004). The River Assessment describes physical characteristics and biological communities of the Manistique River as well as unique resources found within the watershed. The purpose of a River Assessment is to: identify opportunities and problems related to aquatic resources and fisheries within a watershed; provide a mechanism for public comment into fisheries management decisions; and serve as a reference document for those seeking information regarding the Manistique River. The Manistique River Assessment was drafted by Fisheries Division personnel, underwent a significant period of peer and public review and comment, and was completed in October 2004.

The Manistique River Assessment is a comprehensive document with a long-term focus and is intended for use by others beyond Fisheries Division; it identifies options that include items not within the responsibility of Fisheries Division. The Manistique River Management Plan is intended as a document for use by Fisheries Division with the purpose of guiding the Division's management actions within the watershed over the short term. It is intended that the actions identified as priorities, after being weighed against other Lake Michigan Basin and Division priorities, will appear in annual work plans. This is a working document. Therefore it will receive **annual review and update** for progress made and tasks completed.

Prioritization of Actions

The Management Options contained within the River Assessment are consistent with the mission of Fisheries Division, which is to protect and enhance public trust in populations and habitat of fishes and other forms of aquatic life, and promote optimum use of these resources for benefit of the people of Michigan. In particular, the Division seeks to: protect and maintain healthy aquatic environments and fish communities and rehabilitate those now degraded; provide diverse public fishing opportunities to maximize the value to anglers; and foster and contribute to public and scientific understanding of fish, fishing, and fishery management (Fisheries Division 2000). Selection of Management Actions from the Management Options list is also consistent with and is guided by the objectives found in the Fisheries Division Strategic Plan (Fisheries Division 2000).

Both the Management Options in the Assessment and the selection of Management Actions in the Plan follow the recommendations of Dewberry (1992). Actions that protect and restore headwater streams, riparian areas, and floodplains are given priority because the reconnection of streams and floodplains is critical to the health of the entire river system. The river system is viewed as a whole, for whole-system processes drive many important elements of fish habitat. Actions to protect, preserve, and rehabilitate resources take precedence over actions to improve an area or resources above and beyond the original condition.

A number of mitigating factors will alter strict adherence to this order of priorities. Examples of such factors are selection of actions that may:

- 1) result in very high benefit for relatively low expenditure of effort or cost;
- 2) leverage Fisheries Division's resources by capitalizing on existing momentum and opportunities within a specific community or segment of the watershed;
- 3) reflect significant outside interest or support;
- 4) provide the Division with an opportunity to participate in partnerships;
- 5) continue an ongoing project; appear in another Fisheries Division plan (e.g., Lake Sturgeon Rehabilitation Strategy and Fishery Status Reports);
- 6) fulfill a legal requirement (e.g., FERC related actions);
- 7) involve public health concerns; or
- 8) address concerns for threatened and endangered species.

Selecting Management Actions

This list was developed from the Management Options section of the Manistique River Assessment. A copy of Management Options section is attached as an appendix to this document. An individual action item may not address an entire Management Option, as many of the Options are wide in scope and long-term. Rather, an action item will accomplish a portion of a Management Option or take a short-term step towards accomplishing a long-term goal.

For each selected Management Action, this Plan identifies the Management Option being addressed and gives a brief explanation of the factors considered in selecting this action as a priority. Each Action also includes a schedule for up to five years for the accomplishment of the action item. This schedule contains information required for completion of annual work plans. These Actions are listed in order of priority, with the highest priority listed first.

Management Action 1

Proposed Action

Continue to work with Manistique Papers Inc. (MPI), U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service to develop a proposal to remove or repair the Manistique Papermill dam while incorporating fish passage opportunities (i.e., slot weir) and maintaining an effective barrier to sea lamprey.

Management Option Category: Dams and Barriers

Option: Remove the Manistique Papermill dam and install an effective barrier to sea lamprey.

Management Option Category: Biological Communities

Option: Protect against sea lamprey infestation of the watershed. Continue to work with the U.S. Fish and Wildlife Service Sea Lamprey Unit to minimize lamprey passage, to monitor sea lamprey reproduction levels within the watershed, and implement control measures as necessary.

Option: Support goals of the Great Lakes Fishery Commission's Lake Michigan Fish Community Objectives.

Management Option Category: Special Jurisdiction

Option: Protect the watershed from sea lamprey infestation by working with the U.S. Fish and Wildlife Service Sea Lamprey Unit and Manistique Paper Company, Inc. to reduce the potential for lamprey migration into the Manistique River watershed.

Reasons for Selection

The Manistique River is currently viewed as a significant source of sea lamprey production in Lake Michigan due to the failing nature of the dam. Passage of Great Lakes fishes to riverine spawning habitat, upstream from the Manistique Papermill Dam, will benefit resource goals specified for Lake Michigan (Eshenroder et. al 1995). These objectives place a high priority on the restoration and enhancement of historic riverine spawning and nursery areas for potamodromous species, with control of sea lamprey. Self-sustaining stocks of warmwater fish, whitefish species, lake sturgeon, and native fishes would be aided if fish passage occurred.

Schedule

Year 2005:

Personnel days: Basin Coordinator 1 day; Unit Manager 3 days;
Management Biologist 3 days
Special needs: none
Discretionary dollars: none

Year 2006:

Personnel days: Basin Coordinator 1 day; Unit Manager 3 days;
Management Biologist 5 days
Special needs: none
Discretionary dollars: none

Management Action 2

Proposed Action

Identify and manage nuisance beaver colonies.

Management Option Category: Channel Morphology.

Option: Survey cold water streams to identify where high beaver activity (or beaver dam density) adversely affects riparian habitats and stream channel morphology.

Reasons for Selection

Beaver dams on headwater cold water streams can serve to fragment sections of river and hinder fish movement into refuge or spawning habitat. Annual late fall air flights will identify problematic beaver colonies that can be targeted during the legal fur harvest season or by permit according to the Department beaver management policy.

Schedule

Year 2005:

Personnel days: Unit Manager: 1 day, Management Biologist 5 days
Special needs: Air service, flight time rental
Discretionary dollars: \$5,000

Year 2006:

Personnel days: Unit Manager: 1 day, Management Biologist 5 days
Special needs: Air service, flight time rental
Discretionary dollars: \$5,000

Management Action 3

Proposed Action

Develop an inventory of road crossings to identify problem areas and prioritize improvement efforts.

Management Option Category: Soils and Land Use Patterns

Option: Contract Survey road-stream crossings to identify problem areas and implement Best Management Practices at these crossings.

Management Option Category: Dams and Barriers

Option: Survey and develop an inventory of barriers to fish passage, such as culverts, and explore options to correct each problem.

Reasons for Selection

Road crossings act as one of the largest human-derived affects to the watershed. Road crossings can be a significant contributor of point source sedimentation to rivers and may also act to fragment river reaches through perched or improperly sized culverts. Currently, there is no comprehensive database that documents the quantity, type, and distribution of road crossings within this watershed. Road crossing inventories cans serve to identify, evaluate, rank, and prioritize degraded sites.

An electronic documentation of stream crossing sites, prepared in an already existing Microsoft Excel spreadsheet, could be used to allow resource managers to query all sites by; county, township-range-section, degree of affect (sedimentation, perching, etc.), and review sites from a digital picture format. Road crossing inventories are a valuable tool for mid-winter (off-field season) evaluation of sites and for planning (scheduling) site improvements. A road crossing inventory would be a tool that resource managers (State, Federal, local) could use to apply for grants for habitat protection or sediment management.

A road crossing inventory would be accomplished by contract hiring an individual who would traverse each major and minor road in the watershed and document (via an established spreadsheet form) the nature of the site, and obtain an upstream and downstream digital photo of the crossing. The review period would be conducted during normal stream flow conditions between June 1 and October 15. Equipment needed would include: vehicle (rental or personal reimbursement), digital camera, laptop computer, and measuring tape. This contract hire individual would be responsible for each crossing visit, data entry, data compilation, and preparation of a final report.

Schedule

Year 2005:

Personnel days: Unit Manager 1 day, Management Biologist 5 days
Special needs: none
Discretionary dollars: \$50,000

Year 2006:

Personnel days: Unit Manager 1 day, Management Biologist 5 days
Special needs: none
Discretionary dollars: none

Management Action 4

Proposed Action

Maintain and evaluate existing DNR sediment traps; two on the upper Driggs River and two on the Fox River, to control in-stream sand bedloads.

Management Option Category: Channel Morphology

Option: Rehabilitate gravel habitats by removing artificially introduced sand bedload from gravel areas.

Reasons for Selection

In-stream sand bedloads will suffocate bottom gravel areas, thus reducing the health and viability of fish and insect communities. Natural reproduction of brook trout is a desired aspect of a healthy watershed, and would allow for decreased reliance of hatchery stocked fish.

Schedule

Year 2005:

Personnel days: Management Biologist 1 day
Special needs: none
Discretionary dollars: \$2,000

Year 2006:

Personnel days: Management Biologist 1 day
Special needs: none
Discretionary dollars: \$2,000

Management Action 5

Proposed Action

Protect river courses from sedimentation by working with road agencies to stabilize road surfaces and embankments.

Management Option Category: Soils and Land Use Patterns

Option: Protect streams from excessive sedimentation by reviewing road crossing construction proposals to ensure adequate erosion control and protection.

Management Option Category: Channel Morphology

Option: Rehabilitate channel diversity by controlling unnatural sediment contributions and by removing artificially introduced streambed sediment load. Evaluate riverine systems to prevent inappropriate bank armoring or removal of naturally occurring streambed materials.

Management Option Category: Dams and Barriers

Option: Educate resource managers, road commissions, local governments, and citizens on the effects of improper stream crossings.

Management Option Category: Water Quality

Option: Promote public stewardship of the watershed and support educational programs that protect and teach best management practices and prevent further degradation of aquatic resources.

Reasons for Selection

The numerous road crossings over rivers and streams in the Manistique River basin have the potential to affect the health of aquatic systems. Road crossings can impede the upstream movement of fish and aquatic organisms, cause erosion, seriously degrade high gradient areas, impede woody structure transport, and deposit large quantities of sediment in the stream. These crossings can interfere with recreational activities and degrade in-stream habitats.

Schedule

Year 2005:

Personnel days: Unit Manager 1 day, Management Biologist 2 days
Special needs: none
Discretionary dollars: none

Year 2006:

Personnel days: Unit Manager 1 day, Management Biologist 2 days
Special needs: none
Discretionary dollars: none

Management Action 6

Proposed Action

Interagency coordination.

Management Option Category: Special Jurisdictions

Option: Educate resource managers and citizens by annually reviewing work plans and management plans of MDNR Fisheries, MDNR Forest, Mineral and Fire Management Division, USFS, and USFWS Seney Wildlife Refuge. Coordinate and communicate on issues of mutual interest.

Reasons for Selection

Regular interagency communication should be implemented to help all parties identify issues, needs, and areas of cooperation or conflict. Short-term and long-term management goals can be identified, as well as grant funding sources.

Schedule

Year 2005:

Personnel days: Unit Manager 1 day, Management Biologist 2 days
Special needs: none
Discretionary dollars: none

Year 2006:

Personnel days: Unit Manager 1 day, Management Biologist 2 days
Special needs: none
Discretionary dollars: none

Management Action 7

Proposed Action

Stanley Lake Dam investigation.

Management Option Category: Fisheries Management

Option: Investigate effect of northern pike predation and thermal warming influences of the DNR owned Stanley Lake dam (Schoolcraft County) on Little Fox River brook trout fishery.

Reasons for Selection

Stanley Lake may act as a degrading influence on the Little Fox River brook trout fishery. Temperature recorders should be deployed at the outlet of Stanley Lake and within the Little Fox River to evaluate the degree of thermal warming that this lake imposes on the river system. Past fisheries surveys indicate this lake is low in productivity and fails to support an attractive sport fishery. Additional fisheries surveys should be conducted to re-evaluate this fishery and the lake's affect on the riverine fish community. If data supports a dam removal proposal, action should be implemented to remove this structure.

Schedule

Year 2005:

Personnel days: Unit Manager 1 day, Management Biologist 3 days
Special needs: Temperature loggers
Discretionary dollars: none

Year 2006:

Personnel days: Unit Manager 1 day, Management Biologist 5 days
Special needs: none
Discretionary dollars: \$20,000

Management Action 8

Proposed Action

Maintain aquatic nuisance species signage at all boat launch sites.

Management Option Category: Biological Communities

Option: Protect against transfer of aquatic nuisance species into the watershed. Work with Michigan DNR Parks Division to maintain aquatic nuisance species information signage at all boat launch sites. Continue aquatic nuisance species public education discussion with media and sport group contacts.

Reasons for Selection

Aquatic nuisance species are organisms that may become introduced into the watershed and negatively affect the equilibrium of biological communities. Improved signage posting and maintenance can prevent or slow the rate of aquatic nuisance species introduction.

Schedule

Year 2005:

Personnel days: Management Biologist 1 day; Technicians 1 day
Special needs: none
Discretionary dollars: none

Year 2006

Personnel days: Management Biologist 1 day; Technicians 1 day
Special needs: none
Discretionary dollars: none

Management Action 9

Proposed Action

Conduct creel census at Manistique River mouth.

Management Option Category: Biological Communities

Option: Model contribution of Manistique River fishes to the Lake Michigan fish community if fish passage is accommodated at the MPI Dam.

Reasons for Selection

More information is needed on fish communities that occupy the lower Manistique River. Better knowledge of these fish communities and the size of spring and fall fish runs would help with the design of a fish passage structure (i.e., slot weir). If a new dam is constructed at the site of the Manistique Papermill Dam, fisheries managers will need to decide what species of fish to pass upstream and how many of each species to pass. A creel program at Manistique will also allow for an assessment of the annual stocking of walleye, steelhead, chinook, and brown trout.

Schedule

Year 2006:

Personnel days: Unit Manager 1 day, Management Biologist 3 days, Technician Supervisor 4 days
Special needs: none
Discretionary dollars: none (part of statewide creel program)

Year 2007:

Personnel days: Unit Manager 1 day, Management Biologist 3 days, Technician Supervisor 4 days
Special needs: none
Discretionary dollars: none (part of statewide creel program)

References

- Dewberry, T. C. 1992. Protecting the biodiversity of riverine and riparian ecosystems: the national river public land policy development project. Transactions of the 57th North American Wildlife and Natural Resources Conference. Pp. 424-432.
- Eshenroder, R.L., M.E. Holey, T.K. Gorenflo, and R. D. Clark. 1995. Fish Community Objectives for Lake Michigan. Great Lakes Fishery Commission. Special Publication 95-3. Ann Arbor.
- Fisheries Division. 1994. Fisheries Division Strategic Plan. Michigan Department of Natural Resources, Fisheries Division, Lansing.
- Madison, G., and R. N. Lockwood. 2004. Manistique River Assessment. Michigan Department of Natural Resources, Fisheries Special Report, Ann Arbor.

Management Unit Supervisor

Date

Basin Coordinator

Date

Chief, Fisheries Division

Date

APPENDIX

The following is a copy of the **Management Options** section of the Manistique River Assessment, Michigan Department of Natural Resources, Fisheries Division Special Report 31, Ann Arbor.

MANAGEMENT OPTIONS

The Manistique River watershed is a diverse ecosystem that supports a wide array of opportunities for fishing, recreation, agriculture, forestry, and human interaction. Management options presented in this assessment address the most important issues that influence the watershed. These issues are conditions that prevent the watershed from attaining its maximum potential as a healthy system.

The options follow recommendations of Dewberry (1992), who outlined measures necessary to protect the health of river ecosystems. Dewberry (1992) stressed protection and rehabilitation of headwater streams, riparian areas, and floodplains. Streams and floodplains need to be reconnected where possible. Resource managers must view a river system as a whole, as many elements of fish habitat are driven by whole system processes.

The identified management options given here are consistent with the mission statement of MDNR Fisheries Division. This mission is to protect and enhance public trust in populations and habitat of fishes and other forms of aquatic life, and promote optimum use of these resources for the benefit of the people of Michigan. In particular, the division seeks to protect and maintain healthy aquatic environments and fish communities and rehabilitate those now degraded, provide diverse public fishing opportunities to maximize the value to anglers, and foster and contribute to public and scientific understandings of fish, fishing, and fishery management (MDNR, Fisheries Division, files).

Management options cover a wide array of scenarios relevant to the watershed future. These options are presented to address the full scope of issues related to managing the watershed. Primary management options should address habitat protection, rehabilitation (of habitat and fish stocks), and education. Opportunities to improve an area or resources, above and beyond the original condition, are also listed. Education is an option that may focus on educating managers through surveys, research, and resource assessments; or by educating the public through meetings, media, outreach, and public contact.

Geology and Hydrology

The Manistique River has fairly stable flows due to a thick surficial layer of porous glacial deposits, relatively flat landscape and pervious soils. One tributary, Duck Creek, has less-stable flows than expected based on extensive drainage occurring from the Walsh Ditch.

- Option: Protect all existing coldwater, stable streams from effects of land use changes, channelization, irrigation, and construction of dams and other activities that may disrupt the hydrologic cycle, by working with land managers, planners, and MDEQ permit approvals.
- Option: Protect the natural hydrologic regime of streams by protecting existing wetlands, flood plains, and upland areas that provide recharge to the water table.
- Option: Install additional flow gauges in rivers and streams that are currently unmonitored. Installation of gauges will provide crucial flow regime data necessary for appropriate management of systems.

- Option: Protect natural lake outlets by opposing construction of new lake-level control structures. This would allow for the natural fluctuation of water levels needed for maintenance of lake-associated wetlands and shore spawning fishes.
- Option: Protect near shore habitats and floodplain connectivity by encouraging and requiring soft armor methods of bank stabilization (e.g., log or whole tree revetments, and vegetative plantings rather than rock riprap) through permitting processes and cooperative planning.
- Option: Protect groundwater and stream flows by supporting laws that would require major water withdrawals to register with the Department of Environmental Quality Division. Water withdrawal operations should report the volumes used, and document that protected uses of the source of water will not be impaired
- Option: Educate resource managers on the identity and location of aquifer formations in the watershed that provide good groundwater inflow and identify their related biological communities as “of special concern” with Natural Features Inventory.

Soils and Land Use Patterns

Sandy soils in the Manistique River watershed are susceptible to erosion when roadways are developed, when human activity is intense, during urban development, and when improper land use practices are employed. Erosion of soils into streams causes a loss of productivity and health of the respective watercourse.

- Option: Protect and maintain forested buffers along lake shores and river corridors to retain critical habitats and to allow for natural wood deposition.
- Option: Protect remaining stream margin habitats, including floodplains and wetlands, by encouraging vegetation buffer strips in zoning regulations.
- Option: Rehabilitate or improve in-stream culverts or road crossings that are under-sized, perched, misaligned, or placed incorrectly.
- Option: Encourage use of bridges to facilitate road-stream crossings and discourage placement of culverts.
- Option: Encourage bank stabilization and path development in areas where human foot traffic or ORV use is damaging and eroding a bank.
- Option: Encourage careful and judicious development of bank stabilization projects, look at hydraulic flow rates to determine where erosion is naturally occurring, and use soft armor methods of protection in areas where stream valleys are unnaturally eroding.
- Option: Encourage enforcement of soil sedimentation and erosion laws to prevent sedimentation of lakes and rivers.
- Option: Survey road-stream crossings to identify problem areas and implement Best Management Practices at these crossings.

Soil runoff from agricultural lands and earth disturbing activities (construction sites, road building, and logging) can affect the health of the river once soils enter the watercourse. An excessive sand

bedload in a watercourse can cover habitat critical for fish spawning, invertebrate production, and fill-in cover areas.

- Option: Protect developed and undeveloped lands through land use planning and zoning guidelines that emphasize protection of critical areas, minimizing impervious surfaces, and improve storm water management.
- Option: Protect, encourage, and rehabilitate forested floodplain corridors along the river and its tributaries. Encourage tree planting and reforestation throughout the watershed.
- Option: Protect streams from degradation by promoting bore and jacking, or flume methods, of pipeline stream crossings as an alternative to open ditching.
- Option: Protect agricultural landscapes by supporting best management practices and agricultural zoning plans.
- Option: Protect streams from excessive sedimentation by reviewing road crossing construction proposals to ensure adequate erosion control and protection.
- Option: Restore stream banks that are eroding as a result of unnatural events (i.e., human disturbance) with soft-armoring bank stabilization methods.
- Option: Restore the in-stream habitat of the Driggs River, following the Seney Wildlife Refuge restoration of the Marsh Creek connection to the Driggs River.
- Option: Educate land managers, through surveys, on the location of crossings that degrade streams through sedimentation, disrupt stream flow, or create barriers to fish passage.

Channel Morphology

The channel morphology of the Manistique River watershed has developed in response to slope, soils, precipitation, and vegetation. Other than landscape alterations within the Seney Wildlife Refuge, minimal large-scale geographic alteration has occurred to the morphology of stream channels as a result of human interaction. Stream channels have changed due to influences such as dams, road crossings, and channelization.

- Option: Protect and restore riparian forests by educating riparian residents on how riparian forests influence water quality, stream temperatures, trophic conditions, channel morphology, bank erosion and stability, and aquatic, terrestrial and avian communities.
- Option: Rehabilitate gravel habitats by removing artificially introduced sand bedload from gravel areas.
- Option: Protect channel morphology by using bridges or properly sized culverts at road-stream crossings.
- Option: Protect existing large woody structure in stream channels by educating riparian property owners to the value of this structure.
- Option: Rehabilitate channel diversity by controlling unnatural sediment contributions and by removing artificially introduced streambed sediment load. Evaluate riverine

systems to prevent inappropriate bank armoring or removal of naturally occurring streambed materials.

Option: Rehabilitate channel diversity by adding woody structure or habitat improvement structures in reaches where channel diversity is low. Examples would be in areas where past logging practices have eliminated old-growth riparian forests or instream logjams, and in reaches below dams.

Option: Survey cold water streams to identify where high beaver activity (or beaver dam density) adversely affects riparian habitats and stream channel morphology.

Option: Install water level gauge stations at important locations within the watershed (e.g., Fox River system).

Dams and Barriers

There are 54 dams present in the Manistique River watershed resulting in negative effects on aquatic resources. Dams fragment habitat for resident fish, impede potamodromous fish migrations, impound high gradient areas, trap sediments and woody structure, cause flow fluctuations, and fish mortalities, block navigation, and elevate stream temperatures.

Option: Protect the watershed from sea lamprey by working with Manistique Paper Co., Inc. and USFWS to continue blocking sea lamprey migration into the Manistique River from Lake Michigan.

Option: Remove the MPI dam and install an effective barrier to sea lamprey.

Option: Restore Great Lakes fish passage at the MPI dam.

Option: Restore and reconnect the Manistique Lake chain to the mainstem through opportunities such as removing lake-level control structures, thus allowing lakes to function naturally. If a control structure cannot be removed, ensure operation of a control structure at a fixed crest to allow natural stream flow and fluctuation.

Option: Rehabilitate stream habitats and wetland habitats at lake outlets by working with owners of private dams on lake-level management issues.

Option: Survey and develop an inventory of barriers to fish passage, such as culverts, and explore options to correct each problem.

Option: Survey state and federal owned dams to determine their usefulness or potential for removal.

Option: Educate resource managers and citizens on potential dam and lake-level control structures that could be removed by using MDEQ Dam Safety Unit inventory.

Option: Educate resource managers and citizens on the effects of lake-level control structures and the biological benefits of allowing lakes to function naturally.

The numerous road crossings over rivers and streams in the Manistique Basin have the potential to affect the health of aquatic systems. Road crossings can impede the upstream movement of fish and aquatic organisms, cause erosion, destroy high gradient areas, impede woody structure transport and

deposit large quantities of sediment in the stream. These crossings can interfere with recreational activities and degrade in-stream habitats.

- Option: Protect river courses from sedimentation by working with road agencies to stabilize road surfaces and embankments, and by diverting surface water runoff to retention areas for sediment deposition. Maintain retention areas by cleaning and transporting captured sediments to upland locations
- Option: Rehabilitate degraded road crossings by working with state and county road agencies to upgrade crossings with bridges or culverts that are properly sized.
- Option: Educate resource managers, road commissions, local governments and citizens on the effects of improper stream crossings.
- Option: Educate resource managers, road commissions, local governments and citizens on the location of perched culverts, undersized, or misaligned culverts by using surveys and inventory road crossings to identify problem sites.

Water Quality

The chemical nature of water quality is un-effected by human activity throughout most of the watershed. The thermal quality of the water within the watershed is altered in areas where dams (either human-made or beaver dams) are present.

- Option: Promote public stewardship of the watershed and support educational programs that protect and teach best management practices and prevent further degradation of aquatic resources.
- Option: Protect and rehabilitate cold and cool water thermal habitat areas and their biological communities.
- Option: Protect water quality by developing regulatory rules requiring reporting of accidental spills or discharges to wetlands.
- Option: Rehabilitate cold water reaches of streams by encouraging and promoting legal fur bearer harvest of beaver in areas where damming hampers fish migration and degrades trout spawning habitat.
- Option: Survey stream temperature conditions throughout watershed to better assess potential of these waters to support different fishes.
- Option: Survey thermal influence of existing man-made dams to determine their effect on downstream riverine systems.
- Option: Survey stream temperature data by collecting from random sites throughout the watershed, and develop stream classification designations based on the thermal characteristics of these waters.
- Option: Survey dissolved oxygen levels in managed trout lakes to establish current data establishing late winter minimums.

- Option: Survey for limnology data on lakes and streams to establish current data on alkalinity, dissolved calcium carbonate, Secchi disk visibility, and thermocline.

Special Jurisdictions

Land management activities conducted by state, federal, or local units of government have the potential to affect the health, viability and function of aquatic organisms.

- Option: Protect the river system by supporting cooperative planning and decision making among all involved levels of government and citizens.
- Option: Protect the quality of wetlands, streams, and lakes through the enforcement of Parts 31, 91, 301 and 303 of the NREPA Act of 1994.
- Option: Protect the Fox River watershed by promoting adherence to the Natural River zoning ordinances on the Fox River watershed and work with Burt Township in Alger County to adopt the state zoning rules for the portion of managed river located in Burt Township.
- Option: Protect the Indian River by promoting resumption of the study phase to list the Indian River as a federally-designated Natural River. Work towards implementing the management recommendations set forth in the Indian River Wild and Scenic River Management Plan.
- Option: Protect the watershed from sea lamprey infestation by working with USFWS Sea Lamprey Management program and Manistique Paper Company, Inc. to reduce the potential for migration into the Manistique River watershed.
- Option: Protect the lower Manistique River by working with U.S. Army Corps of Engineers on future dredging and maintenance issues related to the lower river.
- Option: Protect the watershed by coordinating with the City of Manistique, and various Townships and County Commissions on recreation, fish management, MDEQ permit issues, and water quality.
- Option: Educate resource managers and citizens by annually reviewing work plans and management plans of MDNR Fisheries, MDNR Forest, Mineral and Fire Management Division, USFS, and Seney Wildlife Refuge. Coordinate and communicate on issues of mutual interest.

Biological Communities

For biological communities of the Manistique River watershed to attain their maximum potential, managers will need to address problems that degrade habitats. The most significant change to biological communities results from fragmentation of watersheds by dams, loss of large woody structure, habitat loss as a result of sediment deposition, and unbalanced predator-prey relationships. Some native species have been lost (e.g., lake sturgeon) while other species have been introduced (e.g., green sunfish). Other fish communities are unable to sustain themselves through natural reproduction and need to be stocked on a regular basis. Exotic introductions of fish and aquatic plant communities pose a serious threat to future health of the watershed.

- Option: Protect fish health of the watershed by screening all private and appropriate public fish stockings to ensure they are free of diseases and undesirable species.
- Option: Protect against transfer of exotic species into the watershed. Maintain exotic species information signage at all boat launch sites. Continue exotic species public education discussion with media and sport group contacts.
- Option: Protect against sea lamprey infestation of the watershed. Continue to work with the U.S. Fish and Wildlife Service Sea Lamprey Unit to minimize lamprey passage, to monitor sea lamprey reproduction levels within the watershed, and implement control measures as necessary.
- Option: Survey to determine status of unknown fish species with historical occurrence.
- Option: Survey distribution and status of species of concern and develop protection and recovery strategies for those species and explore options to protect critical habitat.
- Option: Survey distribution of lake sturgeon populations and explore feasibility of sustaining these populations through stocking or habitat improvement.
- Option: Survey beaver populations and effects on cold water tributaries. Identify measures to control beaver populations where their effects are excessive.
- Option: Survey biological communities in waters lacking data (e.g., Tributaries-central basin, Manistique-mouth sloughs). Surveys need to include distribution and status of fishes, aquatic invertebrates, mussels, amphibians, reptiles, aquatic plants, and pest species throughout the river system.
- Option: Educate resource managers on the identity and location of biological community distributions in the watershed using technology such as geographic information systems.
- Option: Conduct angler creel surveys in the reach of river between the Paper Mill Dam and Lake Michigan to assess anadromous fish runs and angler catch rates.
- Option: Model contribution of Manistique River fishes to the Lake Michigan fish community if fish passage is accommodated at the MPI Dam.
- Option: Support goals of the Great Lakes Fishery Commission's, Lake Michigan Fish-community Objectives.
- Option: Develop and coordinate a strategic plan for future monitoring of biological communities in key locations with MDEQ Water Quality Standards monitoring program. Include inland lake sampling in the strategic plan.
- Option: Development of recreational facilities should consider proximity to wood turtle, and other species of concern, communities. Signage, fencing, or facility design should be considered to protect these species.

Fisheries Management

The diversity of water types within the watershed offers a wide array of management options to support a diverse and attractive sport fishery. Fisheries management goals will follow the mission of the MDNR Fisheries Division, to protect and enhance public trust in populations and habitat of fishes and other forms of aquatic life, and promote optimal use of these resources for the benefit of the people of Michigan.

- Option: Restore Great Lakes fish passage into the watershed. Explore the issue of passing salmon, steelhead, brown trout, and walleye from Lake Michigan. Determine potential effects: on wild trout populations, transport of contaminants to upstream areas (effects on piscivorous wildlife), amount of natural recruitment of these Great Lake migratory fishes, and effects on sport fishing opportunities and Lake Michigan Fish-community objectives.
- Option: Restore predator-prey ratios through various management tools (e.g., manual removals, chemical treatments, predator stocking).
- Option: Rehabilitate trout fisheries in the coldwater reaches of the watershed through habitat improvement (e.g., addition of large woody structure).
- Option: Survey water temperatures and trout survival in managed waters to determine if trout stocking is prudent (e.g., summer temperatures too marginal, natural reproduction able to sustain fishery, or adjust strains).
- Option: Survey potential for re-introducing lake sturgeon in remaining riverine reaches (i.e., Manistique mainstem).
- Option: Stock brook trout, brown trout, lake trout, walleye, muskellunge, smallmouth bass and largemouth bass in areas where appropriate and where self-sustaining populations are unable to maintain a fishery or support only marginal fisheries.
- Option: Investigate effect of northern pike predation and thermal warming influences of the Stanley Lake dam on Little Fox River brook trout fishery.
- Option: Investigate and survey the Manistique-mouth for habitat improvement possibilities, resident fish populations, and status and effects of the wood fibers that lie on the riverbed.
- Option: Manage the Tributaries-upper Indian River, the upstream reaches of the Tributaries-central basin, and Tributaries-Fox River for brook trout and brown trout.
- Option: Manage the Mainstem-middle and Tributaries-lower Indian River for coolwater fish communities such as walleye, largemouth bass, northern pike, and lake sturgeon.
- Option: In the event the MPI dam is removed and if salmonids are shown to be biologically problematic in the upper watershed, install a barrier near the mouth of the Manistique River to block upstream migration of salmonids.
- Option: In the event the MPI dam is removed and if salmonids are shown to be biologically problematic in the upper watershed, install barriers at Highway M-28 river crossings to block upstream migration of salmonids.

Recreational Use

Extensive and diverse recreational opportunities exist throughout the watershed due to the abundance of public-owned lands. Access to various water bodies is good while remote roadless areas also exist in abundance. Both accessible and inaccessible areas are important to provide diverse recreational experiences to the public.

- Option: Protect, encourage, and support existing parks and promote responsible management of riparian areas in public ownership.
- Option: Protect undeveloped access sites from eroding into neighboring water courses.
- Option: Protect popular canoe resting places along rivers from excessive streambank failure due to heavy foot traffic.
- Option: Encourage the development of rustic latrines at popular dispersed, non-developed, campsites.
- Option: Improve canoe portages at all dams.
- Option: Investigate improving existing public access to the Manistique River between MPI dam and Lake Michigan, and increase access opportunities where possible.
- Option: Explore opportunities for cleaning up and improving aesthetics of land area between the MPI dam and Cedar Street boat launch, in the City of Manistique.
- Option: Educate media outlets and tourism agencies to identify recreational opportunities that exist.
- Option: Support funding for fishing piers, river walkways, and other facilities to provide recreational use of the river.

Citizen Involvement

Interested citizens, sport groups, government agencies, and civic municipalities will always have an interest in the health and viability of the Manistique River watershed. Future management of the watershed should involve these citizen groups to the greatest extent possible.

- Option: Protect the watershed by building public support through a network of citizen involvement groups.
- Option: Support communication between interest groups in the Manistique River watershed.
- Option: Educate citizens, local governments, and resource managers on significant management issues by providing information through various media outlets, sport groups, civic leaders, and other land management agencies.
- Option: Work with sport groups on guiding their project proposals and implementation.
- Option: Provide assistance for citizen groups to solicit grants such as the MDNR, Fisheries Division, Inland Fisheries Grant.